

UN5 EE
-D52



ECONOMIC COMMISSION FOR EUROPE
CONFERENCE ON PROBLEMS RELATING
TO ENVIRONMENT

Prague, with a study tour to the regions of Ostrava
(Czechoslovakia) and Katowice (Poland),

2-15 May 1971

Distr.
RESTRICTED

ENV/CONF./D.5/SUMMARY
5 April 1971

Original: ENGLISH

A STUDY OF ENVIRONMENTAL CONDITIONS AND
PROBLEMS IN THE SECTOR OF TRANSPORTATION

Submitted by Switzerland

Prepared by Mr. A. GILGEN,

Institute of Hygiene and of Physiology of Labour,
Federal Polytechnic School, Zurich

SUMMARY

GE. 71-8330

SUMMARY

Traffic and Environment

A. Introduction

1. Traffic affects the environment in several ways. Hence, consideration is given in this report to the following five aspects: noise, air pollution, water pollution, surface requirements and aesthetics.

B. Noise

I. Generalities

2. The disturbing effect of noise depends on four components: on the noise level, on the duration and frequency of individual noise occurrences and on the sensitivity of the individual affected by the noise.

3. Most frequently, noise intensity is recorded as "measured sound level" expressed in decibels according to the evaluation curve A, abbreviated dB(A), or as perceived noise level (PNL) in perceived noise decibels (PNdB).

4. An investigation carried out in Germany showed that 25 per cent of the population was hardly sensitive to noise, while another 25 per cent was clearly sensitive. In a study undertaken in the United Kingdom it is stated that approximately 10 to 15 per cent of the population are particularly sensitive to noise and that the same people also frequently complain about other living conditions in apartments, while 20 to 30 per cent must be classified as non-sensitive to noise.

5. The limit between moderate and excessive noise disturbance can be determined only approximately by medical methods. However, it can undoubtedly be fixed at the level at which a clear majority of the population experiences a considerable reduction in its well-being.

II. Aircraft noise

6. Numerous indicators are used to measure aircraft noise intensities. Most frequently, maximum noise levels and the frequency of noise occurrences are taken into account.

7. Those measures and methods which have been elaborated on the basis of socio-psychological studies should be given preference over those which, although more accurate acoustically, have not been determined in relation to human reactions.

8. In closest association with socio-psychological studies the noise and number index (NNI), the "indice de classification", the "indice isoprophique" and the Dutch "Method B" have been elaborated.

9. The most decisive measures against aircraft noise in the long run are technical measures on the aircraft: construction of silent engines, development of aircraft requiring only short run-ways or no run-ways at all.

10. Noise emission certificates should be compulsory for the approval of new aircraft types. The limits fixed in such certificates must be standardized internationally and should be set up with respect to noise control and not to the national aircraft industry.

11. As long as aircraft noise cannot be sufficiently controlled at its source, the determination of zones for differentiated use in the vicinity of airports is the most important measure. In determining these zones a distinction must be made between built-up areas and areas without buildings. In built-up areas the avoidance of excessive disturbances should be aimed at; in areas without buildings the creation of favourable conditions should be the objective.

12. Expressed in terms of the noise and number index (NNI) the limits applicable in the creation of favourable conditions are 5 to 10 NNI units below those pertaining to the avoidance of excessive noise disturbance.

13. In order to guarantee the population freedom from noise disturbance at night, air traffic should be reduced during this period or completely stopped during some night hours.

14. Civil flights at supersonic speed should be prohibited over densely populated regions.

III. Motor vehicle noise

15. In determining traffic noise, recordings should be made of the noise levels as well as of the frequencies of noise occurrences. These conditions are met by the following methods: total frequency of noise levels in respect of time, permanent noise level equivalent, and traffic noise index (TNI).

16. At intersections and uphill gradients an increase in the mean noise level of approximately 10dB(A) must be accounted for. Hence, accelerating the traffic flow represents a good means of controlling city noise.

17. An additional general loss in the spread of the noise level, apart from the loss caused by distance, occurs over undeveloped and only sparsely developed land to the amount of about 2dB/100m; over densely developed land it is about 5dB/100m.

18. The distance between a high-traffic road (800 to 1200 car units per hour) and residential buildings should, in the absence of any obstacle to the noise spread, be at least 100 to 125 metres.

19. The silencing effect of fixed obstacles is a function of the so-called "shelter-angle" and of the effective height of the obstacle. The material of the obstacle - earth dam, wall, sound-absorbent screen - does not play any significant role. Among the fixed obstacles should also be quoted noise-proof buildings along the street (e.g. air-conditioned office buildings, factories, warehouses).

20. Instead of erecting obstacles between the road and the recipient of noise disturbance on the same level, silencing could also be achieved by lowering the level of the road surface below that of the surrounding area.

21. Already, during the planning stage, the best use must be made of all possibilities for erecting and creating fixed obstacles. The examination of road designs from the point of view of noise control should be obligatory.

22. In general, the noise absorbent effect of green belts is rather over-estimated. A forest with dense undergrowth achieves an additional noise absorption of approximately 10dB/100m.

23. Meteorological factors such as wind and temperature stratifications become significant for the noise spread only at distances of over 400 to 500m.

24. Motor vehicle traffic is the most powerful source of noise disturbance in cities.

25. In city streets lined with houses on both sides, more than half of the inhabitants are "not disturbed" during the day, even with the windows open, as long as the traffic density does not exceed 100 car units per hour

(i.e. 1.6 car units per minute). More than half of the inhabitants feel "disturbed" by 100 to 300 car units per hour (i.e. 1.6 to 5 car units per minute). With over 300 car units per hour (i.e. 5 car units per minute), more than half of the inhabitants claim to be "strongly disturbed".
26. Out of doors, in front of open windows, the traffic noise index should not exceed 74 units; the permanent noise level equivalent should not exceed 45 to 50dB(A).

27. The circulation of private cars in cities should be reduced by deviating the transit traffic and by developing the mass transportation media. Existing city express-roads should be made less attractive to transit traffic by imposing speed limits.

28. Control of the different types of vehicles before their registration is necessary. In this connexion, the limits for new vehicles should be gradually lowered according to a plan established for several years ahead. Vehicles already in circulation should be periodically examined and controlled for noise emission.

29. Taxation of motor vehicles on the basis of the noise caused by them as the only criterion is not suitable.

IV. Rail traffic

30. In the case of rail traffic media - as distinct from the motor vehicle traffic - the rolling noise of the wheels is predominant. Long distance fast trains are loudest because of their high speed. Next loudest are metropolitan trains, followed by tramways and suburban trains.

31. As regards rail traffic, most people are disturbed by the noise of tramways. The replacement of metal wheels by wheels of rubber or a similar material would result in a considerable reduction in noise disturbance.

C. Air pollution

I. Generalities

32. Air pollution in general is caused essentially by three sources: traffic (motor vehicles, railways, aircraft), domestic fires and industry.

33. Besides the emission of combustion gases from the various sources, meteorological factors are important: air stagnation and inversions.

34. Slow traffic flows in cities lead to higher concentrations of air pollutants than do fast traffic flows.

35. In air pollutants, a distinction must be made between gaseous and particle components. Among the gaseous components originating from traffic, those of particular importance are carbon monoxide, nitrogen oxides, aldehydes, aliphatic hydrocarbons and unburned fuels. Sulphur dioxide in ambient air comes essentially from domestic fires and industry. Polluting particles contain numerous chemical compounds among which the most important are cancerogenic polycyclic aromatic hydrocarbons and lead compounds.

36. The difference between positive ignition engines and diesel engines is that the first emit more carbon monoxide while the second emit more nitrogen oxides. Great quantities of particles in the exhaust gases of diesel engines in the form of black or blue smoke which contains large amounts of cancerogenic polycyclic hydrocarbons, are a sign of deficient adjustment of the engine.

37. Air traffic in industrialized countries contributes approximately 0.5 to 1 per cent of the total air pollution.

38. Pollution of the upper layers of the atmosphere by supersonic aircraft may well become an important problem.

II. Effects of air pollution

39. A strong increase in air pollution lasting several days leads to a steep increase in morbidity and mortality.

40. Chronic effects range from an impairment of the pulmonary functions without noticeable symptoms to an increase in morbidity and mortality due to infection of the respiratory tract, to an increase in mortality due to lung and other cancers and to an increase in infant mortality. Particularly important are the permanent effects of low concentrations (20 to 30 ppm) of carbon monoxide which, in the case of long lasting absorption, affects the nervous system and hence may have a negative influence on traffic safety.

41. The pollution of the atmosphere by gases and particles is a severer problem than the decrease in oxygen in the atmosphere.

III. Measures to be taken

42. The most important and decisive measure is the limitation of motor vehicle exhaust gases by law. The USA has shown the way in this respect. It would be perfectly possible for Europe to adopt the American standards.

43. A gradual reduction in the emission of exhaust gases from new types of motor vehicles should be imposed upon motor vehicle manufacturers. It is not enough to reduce a single component of the exhaust gases - for instance, carbon monoxide - because this may result in an increase in the remaining air polluting compounds.

44. Vehicles already in circulation must be periodically checked with respect to the emission of exhaust gases. Insufficiently maintained vehicles should be withdrawn from circulation.

45. The taxation of motor vehicles on the basis of the quantity of exhaust gases which they emit is not an appropriate measure under present day conditions.

46. Besides the limitation of emissions, the introduction of emission standards is required. When emission standards are exceeded, specific measures - including a temporary limitation of motor vehicle traffic - must be taken immediately in order to avoid a further increase in air pollution.

47. In the long run, the development of engines which produce only little or no exhaust gases at all should be promoted.

D. Water pollution

48. With regard to transportation, the principle pollution of waters is by oil.

49. Technical regulations and police action are necessary to prevent water pollution.

E. Surface requirements

50. The total surface required by one million cars for parking is approximately 25km^2 ; for the same number of cars when circulating, the total road surface is 160 to 600km^2 .

51. The bulk of transportation requirements in cities can therefore only be met by mass transportation media. Public transportation should have priority. This should be aimed at by increased investment, police action and attractive prices in public transportation media.

F. Aesthetics

52. Out of every one million motor vehicles, 100,000 are discarded annually, occupying a surface of 1km^2 . Compressed into cubes of 1m^3 per vehicle, 100,000 car wrecks form a heap 10m in height on a ground surface of 100 x 100m.

53. As soon as motor vehicles are put into use, arrangements should be made to recover the cost of their eventual disposal.

UN5 EE
-DS2



ECONOMIC COMMISSION FOR EUROPE

**CONFERENCE ON PROBLEMS RELATING
TO ENVIRONMENT**

**Prague, with a study tour to the regions of Ostrava
(Czechoslovakia) and Katowice (Poland),**

2-15 May 1971

Distr.

RESTRICTED

ENV/CONF/A.3

6 April 1971

ENGLISH

Original: ENGLISH

PROVISIONAL LIST OF DOCUMENTS

Note by the Secretariat

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

DOCUMENTATION

All documents prepared for the Conference bear the symbol "ENV/CONF/...".

The following series of documents have been issued:

ENV/CONF/A.1, etc.
ENV/CONF/B.1, etc.
ENV/CONF/C.1, etc.
ENV/CONF/D.1, etc.
ENV/CONF/E.1, etc.
ENV/CONF/F.1, etc.
ENV/CONF/G.1, etc.
ENV/CONF/H.1, etc.
ENV/CONF/I.1, etc.
ENV/CONF/J.1, etc.

- the A series includes, inter alia, the programme and organization of the Conference, the provisional list of participants, the provisional list of documents issued, and the provisional agenda;
- the B series comprises country monographs on problems relating to environment;
- the C series comprises general papers, i.e. three introductory reports, a revised review of country monographs, a feasibility study on the international environmental information-exchange system and a summarizing paper on environmental issues of critical importance;
- the D series consists of studies on problem-sectors;
- the E series comprises studies on problem-areas;
- the F series consists of discussion papers on "Types of environmental action and means for their implementation";
- the G series covers the background papers with special reference to the panel discussion on major socio-economic questions relating to environment;
- the H series includes contributions especially prepared for the Conference (but not relating exactly to any of the discussion topics) submitted by ECE, other units of the UN Secretariat, UN Specialized Agencies, international organizations and individual countries;
- the I series provides for official documents concerned with organizational and substantive matters related to the Conference such as the film show, exhibitions and the study tour, which have been prepared and issued by the host authorities and which will be distributed at the Conference;
- the J series includes other papers.

A complete list of these documents is given in the following pages.

The availability of documents is shown by letters:

f = document available in full version

s = document available in summary form

- = document not available^{1/}

- (t) Although every effort has been made in order to ensure distribution of the Conference documents in advance, some of them, because of their late submission or due to the burden imposed on the translation services, will be available only at the Conference. This relates, inter alia, to documents marked (t).

^{1/} It should be noted that, as a matter of principle, country monographs in series B and contributions by international organizations have been issued only in the ECE working languages submitted and no translation has been provided by the Secretariat. This also applies for the J series.

Subject of the document	Symbol	Available in		
	ENV/CONF/...	English	French	Russian
<u>A series</u>				
Programme and Organization	A.1	f	f	f
Information regarding attendance, etc.	A.1/Add.1	f	f	f
Provisional list of participants	A.2	f(t)	f(t)	f(t)
Provisional list of documents	A.3	f	f	f
Agenda of the Conference	A.4	f	f	f
<u>B series</u>				
Country monograph - Fed. Rep. Germany	B.1	f	f	f
" " Switzerland	B.2	-	f	-
" " Sweden	B.3	f	f	f
" " Italy	B.4	-	f	-
" " Finland	B.5	f	-	f
" " Hungary	B.6	f	f	f
" " USA	B.7	f	f	f
" " Bulgaria	B.8	f	f	f
" " Netherlands	B.9	f	f	-
" " France	B.10	f	f	f
" " UK	B.11	f	f	f
" " Poland	B.12	-	f	f
" " Byelorussian SSR	B.13	-	-	f
" " USSR	B.14	-	-	f
" " USSR	B.14/Rev.1	f	f	-
" " Ukrainian SSR	B.15	-	-	f
" " Cyprus	B.16	f	-	-
" " Yugoslavia	B.17	f	-	-
" " Denmark	B.18/Rev.1	f	-	-
" " Austria	B.19	f	-	-
" " Turkey	B.20	f	-	-
" " Czechoslovakia	B.21	f	f	f
" " Romania	B.22	f	f	f
" " Belgium	B.23/Rev.1	f	f	f
" " Norway	B.24	f	-	-
" " Malta	B.25	f	-	-
" " Portugal	B.26	f	-	-

Subject of the document	Symbol ENV/CONF/...	Available in		
		English	French	Russian
<u>C series</u>				
Introductory report by the United Kingdom (No. I)	C.1	f	f(t)	f(t)
Introductory report by Czechoslovakia (No. II)	C.2	f(t)	f(t)	f(t)
Introductory report by the ECE Secretariat (No. III)	C.3	f(t)	f(t)	f(t)
Revised review of country monographs	C.4	f	f	f
Feasibility study	C.5	f	f	f
Environmental issues of critical importance	C.6	f(t)	f(t)	f(t)
<u>D series</u>				
Study by Czechoslovakia	D.1	f	f	f
Study by IAEA	D.1/1	f	f	f
Study by the Federal Republic of Germany	D.2	f	s	s
Study by the USSR	D.3	f	f(t)	f
Study by Belgium	D.4	s(t)	f(t)	s(t)
Study by Switzerland	D.5	s	f	s(t)
Study by the United Kingdom	D.6	f	f	f
	D.6/Corr.1	f	-	-
Study by Hungary	D.7	f	f	f
Study by FAO	D.7/1	f	-	-
<u>E series</u>				
Study by France	E.1	f	f	f
Study by USA	E.2	f	f	f
Study by Yugoslavia	E.3	f	f	f
Study by IUCN	E.3/1	f	f	-
Study by Poland	E.4	f	f	f
Study by Italy	E.5	f	f	f
<u>F series</u>				
Discussion paper by France	F.1	f	f	f
Discussion paper by USSR	F.2	f	f(t)	f
Discussion paper by Yugoslavia and Belgium	F.3 ^{2/}	f	f	f(t)
	F.4	see foot_note 2/		

^{2/} Contrary to the information included in the Conference Programme (ENV/CONF/A.1), the two contributions which were originally envisaged as being made by Belgium and Yugoslavia respectively in documents F.3 and F.4 have been combined in one single document F.3. Consequently, an explanatory note only will be distributed under symbol ENV/CONF/F.4.

Subject of the document	Symbol	Available in		
	ENV/CONF/...	English	French	Russian
<u>F series (continued)</u>				
Discussion paper by Czechoslovakia	F.5	f(t)	f(t)	f(t)
Discussion paper by Netherlands	F.6	f	f	f
Discussion paper by USA	F.7	f	s	s
Discussion paper by Netherlands	F.8	f	f	f
Discussion paper by USSR	F.9	f(t)	f(t)	f(t)
Discussion paper by USA	F.10	f	f	f
Discussion paper by Poland	F.11	f	f	f
Discussion paper by Sweden	F.12	f	f(t)	f(t)
Discussion paper by ECE consultant Mr. Morpurgo	F.13	f	f	f(t)
Discussion paper by IULA	F.14	f	-	-
Discussion paper by IUCN	F.15	f(t)	f(t)	f(t)
Discussion paper by UNESCO	F.16	f(t)	f(t)	-
<u>G series</u>				
ECE work programme	G.1	f	f	f
Terms of reference for Senior Environmental Advisers	G.1/Add.1	f	f	f
Paper by ECE - review of socio-economic issues	G.2	f	f	f(t)
Paper by ECE consultant Mr. Dahmén	G.3	f	f	f
	G.3/Corr.1	f	-	-
	G.3/Corr.2	-	f	-
Paper by ECE consultant Mr. Kneese	G.4	f	f	f
	G.4/Add.1	f	-	-
Paper by ECE consultant Mr. de Jouvenel	G.5	f	f	f(t)
Paper by ECE consultant Mr. Leszczycki	G.6	f(t)	f(t)	f(t)
<u>H series</u>				
Paper by the ECE Housing, Building and Planning Committee	H.1	f	f	f
	H.1/Add.1	-	f	-
	H.1/Add.2	-	-	f
Paper by International Council for Building Research, Studies and Documentation (CIB)	H.2	f	-	-
Paper by UN Division of Social Affairs	H.3	f	-	-

Subject of the document	Symbol	Available in		
	ENV/CONF/...	English	French	Russian
<u>H series (continued)</u>				
Paper by Council for Mutual Economic Assistance	H.4	f	f	f
Paper by World Health Organization (WHO)	H.5	f	f	f
Paper by WHO Regional Office	H.6	f	f	f
Paper by Federal Republic of Germany	H.7	f	s	s
Paper by Belgium	H.8	f(t)	f(t)	f(t)
Paper by OECD	H.9	f(t)	-	-
<u>J series</u>				
Paper on "The systematic reclamation of disused Lignite mining territories in the German Democratic Republic"	J.1	f	-	f
Paper on "The systematic organization of environment in the German Democratic Republic on the basis of the country master plans"	J.2	f	-	f
Paper on "Measures taken by the State to ensure water pollution control and on automatic utilization of ground and surface water in the German Democratic Republic"	J.3	f	-	f
<u>Miscellaneous</u>				
Paper by the ECE Secretariat - Identification of information	ENV/W.P.No. 4	f(t)	f(t)	f(t)
Paper by the ECE Secretariat - Report of the Meeting of Senior Governmental Advisers on Environment	E/ECE/ENV/2	f(t)	f(t)	f(t)
Progress Report by the ECE Executive Secretary on Problems of Environment	E/ECE/793	f(t)	f(t)	f(t)

